

## PATENT COOPERATION TREATY

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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 904097	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/JP2004/007469	International filing date (day/month/year) 25.05.2004	Priority date (day/month/year) 31.07.2003	
International Patent Classification (IPC) or national classification and IPC H02M3/335, H02M3/157			
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 4 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  08.11.2004		Date of completion of this report  18.10.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer  Imbernon, L  Telephone No. +31 70 340-2507	



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/JP2004/007469

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-27 as originally filed

**Claims, Numbers**

1, 3-6, 8, 9 received on 18.07.2005 with letter of 15.07.2005

**Drawings, Sheets**

1/8-8/8 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
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International application No.  
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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1,3-6,8,9
	No: Claims	
Inventive step (IS)	Yes: Claims	1,3-6,8,9
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1,3-6,8,9
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

1. The following documents are referred to in this communication:  
D1: US-B-6 417 6531 (WICKERSHAM ROBERT D ET AL) 9 July 2002  
D2: US-A-5 666 463 (SCHOENBAUER STEVE D ET AL) 9 September 1997
2. INDEPENDENT CLAIM 1
  - 2.1. D1, regarded as being the closest prior art, discloses in figure 1 a DC/DC voltage conversion device comprising a voltage converter (elements 135, 120), detection means ( $V_{out}$  130 applied to 180) and control means conducting feedback control in a manner that the output voltage is equal to a first target voltage (set point of the output voltage level), the feedback being conducted by changing the reference voltage ( $V_{ref}$ ) to a second level (second target voltage) in case of sudden increase of load, in such a manner that a deviation between this voltage reference (second target voltage) and the output voltage decreases (ie  $V_{ref}$  decreases when the load current increases and the output voltage decreases).
  - 2.2. The subject-matter of claim 1 differs from this known converter with reference voltage modification, in that:
    - the deviation between the modified reference and the output voltage is clamped to be at most a predetermined value,
    - when the voltage starts to increase after having been decreasing, the rate of change of the modified reference is clamped to be at most a standard value.
  - 2.3. The problem to be solved by these additional features may be regarded as how to avoid overvoltage and minimize deviation.
  - 2.4. The solution to this problem proposed in the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:  
The use of a rate of change limiter is known from D2 in order to reduce "power supply surge currents and power supply voltage noise spikes" (see column 2, lines 40-42). However there are no hints nor indications in D2 so as to lead the skilled person to

the solution of conducting such a rate of change limitation only during the portion of the transient where the voltage increases after having been decreasing, while conducting another type of control in the rest of the transient.

It would require besides much more than a straightforward modifications of said prior art teachings in order that the skilled man arrives to a control as defined in claim 1, especially as the use of a derivative algorithm (column 2) already minimizes the dynamic error.

**3. INDEPENDENT CLAIM 6**

The same reasoning as for independent claim 1 would apply mutatis mutandis to the subject-matter of claim 6 in order to demonstrate its novelty and inventive step (Article 33(2) and (3) PCT).

**4. DEPENDENT CLAIMS 3-5, 8 AND 9**

Claims 3-5, 8 and 9 are dependent on claims 1 and 6 and as such also meet the requirements of the PCT with respect to novelty and inventive step.